ALIAH UNIVERSITY
Even Semester Examination (Spring) 2023-'24
PAPER – MATUGBS02
(Engineering Mathematics-II)
Semester – II

Full Marks – 80 Time Allowed– 3 Hours

Unless otherwise stated, symbols have their usual meanings. *Use seperate answer script for each group.*

Group–A (40 Marks)

Answer any FOUR of the following questions: $(4 \times 10 = 40)$

1. (a) If A is a skew symmetric matrix, prove that $(I-A)(I+A)^{-1}$ is orthogonal. [5]

   (b) If $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$, show that $A^2 - 4A - 5I_2 = O$. Hence find A^{-1}. [5]

2. (a) What do you mean by the linear dependence of vectors? Find the values of k, so that the vectors $(1,2,0)$, $(k,0,1)$, $(1,k,1)$ are linearly dependent. [1+4]

   (b) Define eigen value and eigen vector of a square matrix. Find the eigen values of the following matrix $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$. [5]

3. (a) Find the Echelon form of the matrix $\begin{bmatrix} 1 & 3 & 2 & 4 & 1 \\ 0 & 0 & 2 & 2 & 0 \\ 2 & 6 & 2 & 6 & 2 \\ 3 & 9 & 1 & 10 & 6 \end{bmatrix}$ using elementary row operations. [5]

   (b) Define rank of a matrix. Find the rank of the matrix $\begin{bmatrix} 8 & 1 & 3 & 6 \\ 0 & 3 & 2 & 2 \\ -8 & -1 & -3 & 4 \end{bmatrix}$. [1+4]

4. (a) For what values of k, the following equations $x+y+z=1$, $2x+y+4z=k$, $4x+y+10z=k^2$ have solutions and solve them completely in each case. [5]

   (b) State Cayley-Hamilton theorem. [1]

   (c) (i) Using Cayley-Hamilton theorem, find the inverse of the matrix $\begin{bmatrix} 2 & -1 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 2 \end{bmatrix}$. [4]

   OR, (ii) If $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$, find A^{100} by Cayley-Hamilton theorem. [4]

5. (a) State the conditions for consistency of a non-homogeneous system of equations. Solve the system of equations $x+5y=1$, $2y-z=2$, $x+3z=-1$. [1+4]

   (b) What do you mean by the linear independence of vectors? Check whether the vectors $(2,1,4)$, $(1,-1,2)$, $(3,1,-2)$ are linearly independent or not. [1+4]

6. (a) (i) Find the modulus and the principal value of argument of $1 + i \tan \frac{3\pi}{5}$. [6]
OR, (ii) Show that for any four non-negative real numbers a, b, c and d, the following relation holds $a^5 + b^5 + c^5 + d^5 \geq abcd(a + b + c + d)$. [6]

(b) Solve the equation $z - 12 = i(9 - 2\bar{z})$, where $z = x + iy$. [4]

7. (a) (i) Find the value of ω^n, where ω is a root of the equation $z^2 + z + 1 = 0$ and $n \in \mathbb{Z}$. [5]
OR, (ii) Solve $z^3 = 1$. [5]

(b) (i) Prove that the determinant $\begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{vmatrix}$ is a perfect square. [5]

OR, (ii) If one of the roots of the equation $x^3 - 5x^2 + ax + b = 0$ (where $a, b \in \mathbb{R}$) is $2 + i$, then find other two roots and also find the value of a and b. [5]

GROUP - B (40 marks)

Answer any EIGHT of the following questions: $(8 \times 5 = 40)$

1. Solve the differential equation $(x^2y - 2xy^2)dx - (x^3 - 3x^2y)dy = 0$. [5]

2. Solve the linear differential equation
(a) $\frac{dy}{dx} + \frac{2x}{1+x^2}y = \frac{1}{x^2}$, OR, (b) $\frac{dy}{dx} - \frac{\tan y}{1+x} = (1 + x)e^x \sec y$. [5]

3. Solve the Bernoulli's differential equation $\frac{dy}{dx} + \frac{y}{2} = -e^{-x}y^3$. [5]

4. (a) Find the integrating factor (I.F.) of the differential equation $(y \log x + y)dx + dy = 0$ and hence solve the differential equation, [5]
OR, (b) Find the integrating factor (I.F.) of the differential equation $3ydx - 2xdy + x^2y^{-1}(10ydx - 6xdy) = 0$ and hence solve the differential equation. [5]

5. Solve: $y + px = p^2x^4$, where $p = \frac{dy}{dx}$. (You may use 'solvable for y' method.) [5]

6. Solve: $x^2p^2 + 2pxy + y^2 - 1 = 0$, where $p = \frac{dy}{dx}$. [5]

7. Solve: $\frac{d^3y}{dx^3} - 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} - y = 3x^2 + 1$. [5]

8. Solve: $\frac{d^2y}{dx^2} - y = xe^x$. [5]

9. Solve: $\frac{d^2y}{dx^2} + a^2y = \cos ax$. [5]

10. (a) Show that the solution of the differential equation (Clairaut's form) $y = px + f(p)$ is $y = cx + f(c)$ where c is an arbitrary constant and hence solve $y = px + p^2$. [5]
OR, (b) Prove that the necessary and sufficient condition of exactness of the differential equation $Mdx + Ndy = 0$ is $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$. [5]

—— End ——

ALIAH UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING
Internal Examination for CSE

Subject- Workshop practice **Full marks -40**
Subject code -MENUGES02 **Time -1 hrs**

1. Fill in the blanks 1x5

a) _____ is use to check the straightness of any metal work surface.

b) _____ instrument is use for holding the circular type of job for marking and machining.

c) _____ instrument is use for scribing arcs on metal surface.

d) A center punch has an angle of _____ degree at the tip.

e) For smoothing the rough edge we use _____ in workshop

2. Chose the correct option 1x5

A. The difference between the value of one main scale division and one vernier scale division is known as

a) Least count b)Resolution c)Actual reading d)None of the options

B. Which is the large scale on the body of the vernier calliper?

a) Vernier scale b) Main scale c) all of the above d) none of the above

C. Which one is the Marking tool.

a) Surface plate b) Try square c) Scriber d) Angle plate

D. Which is use to measure the internal diameter.

a) Outside calliper b) inside calliper c) vernier caliper d) both b&c

E. This instruments is use for forming internal threads

a) Tap b) die c) punch d) hacksaw

3. Answer the following question 2X5

a) What are the difference between prick punch and center punch?

b) Write the name of four types of file use in workshop?

c) Describe the inside, outside and odd leg calipers according to their function and uses.

d) Write down the name of different types of spanner use in workshop.

e) What is the Formulae of calculating total reading in a vernier caliper

4. Answer the question (Answer any five) 4x5

a) Describe the various parts of ball peen hammer with sketch.

b) Write down the parts of a micrometer with sketch

c) Name the parts of hacksaw with net sketch.

d) Describe the function of different type of file and their use.

e) Write the name of various types of circlip players and describe its functions.

f) Write down five major safety measures at workshop.

ALIAH UNIVERSITY

Name of the Examination: Even Semester **Year: 2024**
Subject: Engineering Chemistry **Course code: CHMUGBS01**
Duration: 3 Hrs **Full Marks: 80**

Use separate answer scripts for each group

Group A

01. Explain the following terms **(answer any FOUR)**: (a) State function (b) Reversible process (c) Molar heat capacity (c) Entropy (d) Intensive property (e) Joule Thomson phenomenon. 2.5×4

answer any ALL from the following questions

02. (a) Deduce the formula for the work done during an isothermal and reversible expansion of an ideal gas.(b) Sketch the pressure-volume (P *vs* V) graphs for the isothermal expansion of an ideal gas, illustrating both reversible and irreversible processes. 2.5+2.5

03. (a) Derive the relationship ΔH = ΔE+ΔnRT (b) What is the basic principle of Joule-Thomson effect? 2.5+2.5

04. (a)Distinguish between closed and isolated system. Give examples. (b) Differentiate between reversible and irreversible processes. 2.5+2.5

05. (a)What do you understand by C_P and C_V of gases? (b) Why is the value of C_P always greater than that of C_V? How are they related? 2.5+2.5

Group B (Answer any TEN)

5× 10 = 50

06. Write short notes on:
(i) Teflon (ii) Bakelite

07. How the following polymers prepared? Mention their uses
(i) PVC (ii) LDPE

08. (a) Write informative notes on the mechanism of radical polymerisation
(b) What is meant by green chemistry?

09. (a) What is meant by degree of polymerisation ?
(b) Distinguish between addition and condensation polymerisation with examples.

10. (a) How is the Crepe rubber obtained from latex ?
(b) Give the structural unit of gutta percha.

11. Explain the following with suitable reactions (i) Polystyrene (ii) Phenol formaldehyde resin

12. Why are silicones called inorganic polymers? Discuss the synthetic procedure of linear chain silicones.

13. What is meant by the vulcanisation of rubber? How vulcanisation takes place? Write its uses?

14. What is Biopolymers? How is it prepared? Give some importance of Bioploymers.

15. (a) How will you prepare Styrene-Butadiene Rubber (SBR). Mention its uses.
(b) What is Ziegler Natta catalyst with some application.

16. Write a note on conducting polymers with reference to oxidative or p-doping with mechanism.

17. Write note on: (a) Compounding of rubber (ii) Conducting polyaniline

18. (a) Explain the importance of green chemistry.
(b) Discuss the use of microwave radiation in green chemistry with an example.

19. (a) Why water is used an alternative solvent in green synthesis.
(b) Prepare aspirin from salicylic acid using green synthesis process.

Aliah University

Department of Electrical Engineering, B-Tech
Even (Spring) Semester Examination, 2024 (Reg./Supple)
Subject: Basic Electrical Engineering **[EENUGES01]**

Full Marks: 80 | **Time: 3 Hours**
Year:I | **Semester: II**

Instructions:
1. Mention the question number clearly and write all the parts of a question at one place.
2. Draw circuit/figure/phasor diagram wherever applicable (including numerical).
3. Make suitable assumptions wherever necessary, symbols and notations have their usual meanings.

1. i) What is the time constant of series RC circuit with R=10kΩ and C=40μF. **2x10= 20 Marks**
ii) Voltage across capacitor and current through an inductor cannot change instantaneously. Justify.
iii) A 200/50V, 50 Hz single phase transformer is connected to a 200V, 50 Hz supply with secondary winding open. What is the value of maximum flux through the core, if the primary winding has 400 turns?
iv) Give two basic speed control schemes of DC shunt motor?
v) When we switch on the lights one after the other in our house, what is the effect on the resistance of the electric circuit of the house? What will happen on the current flowing in the main circuit?
vi) Is Ohm's law true for all conductors? Name two types of commercially available resistors..
vii) A resistor of 8Ω and a capacitor of 178μF are connected in series to a 250V, 50 Hz supply. Net impedance of the circuit is given by 19.6Ω. What is the value of reactive power?
viii) Can DC be applied to transformers?
ix) What will happen if DC shunt motor is connected across AC supply?
x) Give application of all types of DC generators.

Answer any five questions 5x12=60 Marks

2. a) Use mesh analysis to compute the voltage across 10Ω resistor in **Fig. 1.**
b) Use nodal analysis for computing current through the 5Ω resistor in **Fig. 2** 6+6

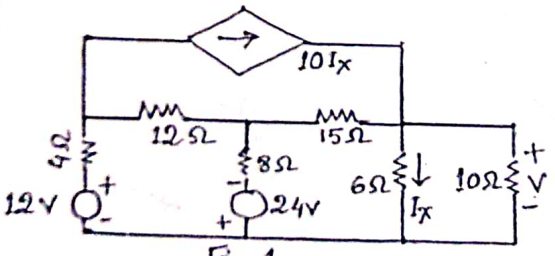


Fig. 1

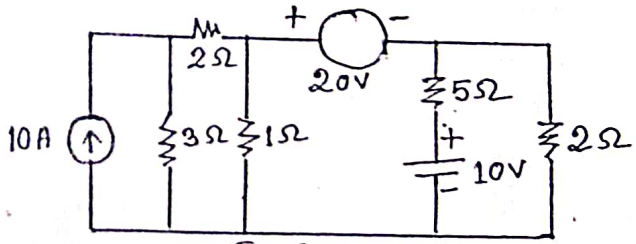


Fig. 2

3. a) Find V_0 in the circuit of **Fig.3** using Thevenin's theorem.
b) Find the current i using superposition theorem for the circuit shown in **Fig.4.** 6+6

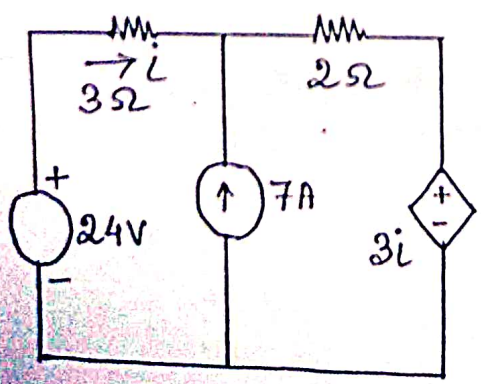


Fig. 4

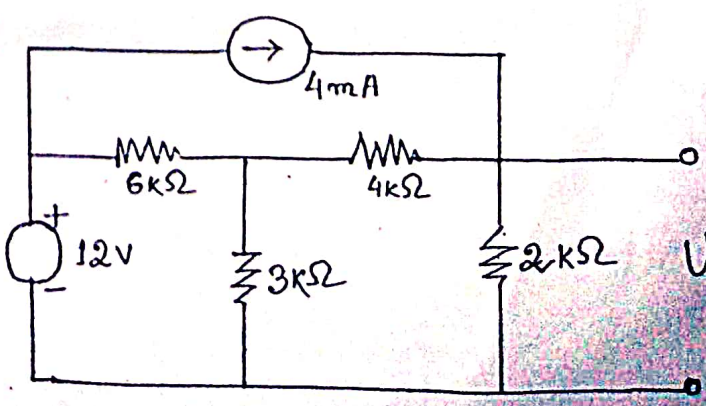


Fig. 3

4. a) In R-C circuit with DC excitation (source free) determine capacitor voltage and capacitor current.
   b) In an RC circuit with R = 25 Ω and C = 50 μF is a capacitor being charged with initial zero voltage. What is the time taken for the capacitor voltage to reach 40 % of its steady state value? 6+6

5. a) Write a short note on characteristics of DC series motor. 6+6
   b) An 8-pole dc motor has a wave-wound armature with 900 conductors. The useful flux per pole is 25 mWb. Determine the torque exerted when a current of 30A flows in each armature conductor.

6. a) At what condition transformer will give maximum efficiency? Prove for the same. 6+6
   b) A 50 kVA single-phase transformer is connected to a 2500V, 50 Hz supply. The primary and secondary turns are 500 and 100 respectively. Determine the following:
      i) Open circuit secondary voltage.
      ii) Current following through the secondary windings on full-load.
      iii) The maximum value of flux.

7. a) A circuit consisting of resistance of 10Ω, an inductance of 13 mH and a capacitance of 150 μF connected in series. A supply of 100 V at 50 Hz is given to the circuit. Find the impedance, current, power factor and power consumed in the circuit.
   b) Write a short note on power triangle. 6+6

8. a) What is an ideal transformer? Draw phasor diagram at different loads for an ideal transformer.
   b) Draw R-L-C series circuit with its phasor diagram. Find out the expression of current, phase angle and power. 6+6

Aliah University

End-Semester Examination (Even Semester) - 2024

(CSE 1ST Year 2ND Semester)

Subject Name: Programming for Problem Solving **Full Marks: 80**

Subject Code: CSEUGES01 **Time: 3hrs**

Group-A

(Answer all questions) **10× 1 = 10**

1.

a. Find the expression value : X=3 * 4 % 5 / 2

b. If y=11000101 then find value of y<<2 .

c. The ..... statement is used to skip statements in a loop.

d. On 16 bits systems, integer variable is allocated ..... Bytes.

e. Function that calls itself is known as a ..... Function.

State True or False

f. variable first is same as First.

g. C does not permit nested switch statements.

h. The default label can be placed anywhere in the switch statement.

i. All the elements of the array are automatically initialized to zero when the array is defined.

j. Array name can be used as a pointer.

Group-B

(Answer any five questions) **5× 6= 30**

2. Explain ternary and increment operators with examples. (3+3=6)

3. Define Interpreter, compiler and Loader. (2+2+2=6)

4. Write a C program to print the prime numbers from 100 to 200. (6)

5. Explain the importance of the following loop control statements with example.
(a). The break statement (b). The continue statement . (3+3=6)

6. Find the output of the following code.

(a)
```
#include<stdio.h>
main()
{ int arr1[]={0,1,2, 0,1,2, 0,1,2,0};
int i , arr2[10];
for(i=0; i<10;i++)
        arr2[i]=arr1[9-i];
for(i=0; i<10;i++)
 printf("\t %d", arr2[i]);
return 0;

}
```

Identify the errors in the following and write the correct code.

(b) Int marks[2,3]={10,20,30},{40,50,60}

(c)
```
main()
{ char str[]={'h','e','l','l','o'};
  printf("\n str=%s", str);
}
```

(2+2+2=6)

7. Consider an array int marks[10][6] where base address=500 and number of words per memory location of the array=2. Compute the address of marks[7][4] in row major and column major order. (3+3=6)

Group-C

(Answer any four questions) **4 × 10 = 40**

8. Define function. Write a C program to find the sum of the digits of a number. (123 =>1+2+3=6) (2+8=10)
9. What is array? Write a program to transpose 3× 3 matrix. (2+8=10)
10. Explain the characteristics and need of an algorithm . Draw a flowchart to find the max of three numbers and explain. (2+8=10)
11. What is File? Create a text file like studentname.txt, Write your name , roll number ,course into the File. (2+8=10)
12. Define Union. Describe how to declare, initialize and access members of Union with a programming example (2+8=10)

ENGUGHU01: Communicative English

End Semester Examination2024

(For the 2nd Semester Students of all the Departments of the Engineering Faculty)

Full Marks: 80 **Time: 3 Hours**

Section I

1. Answer ANY TEN of the following questions: **2x10=20 Marks**

1. What is extra-personal communication?
2. what does the word 'Communicare' mean?
3. What is feedback in communication?
4. What is *lingua franca*?
5. What is semantic gap?
6. What is passive listening?
7. What is skimming in reading?
8. What is modal verb? Give an example.
9. Give an example of Grapevine communication.
10. What is active listening?
11. How many consonant sounds are there in English language?
12. What is homophone? Give an example.
13. What is phrase? Give an example.
14. What are the channels of communication?
15. What is monologue?

Section II

2. Answer **ANY FOUR** of the following questions: (word limit 200) **5x4=20 Marks**

1. Distinguish between formal and informal communication.
2. Define body language. Mention some of the gestures we use to communicate.
3. Write a short dialogue between two friends discussing the price hike.
4. What is the difference between summary and paraphrase?
5. What are the important features of close reading?
6. What are the processes of documenting?
7. What is business communication? What are the methods of business communication?

Section III

3. Answer **ANY FOUR** of the following questions. (word limit 400) **10X4=40 Marks**

1. Identify the notable barriers of an Effective Communication. Discuss the means to overcome those barriers. (6+4)
2. Attaching a Resume, write a job application for the post of a teacher in a college. (10)
3. Define and discuss the differences between Verbal Communication and Non-verbal Communication. (10)
4. Explain the different flows of communication in the business organisations. (10)
5. Define Intra-personal Communication and Inter-personal Communication. Discuss the differences between Intra-personal Communication and Inter-personal Communication. (5+5)
6. Write an email to the Head of your Department to extend the date of the submission of the tutorial project due to your illness.
7. Write a report of the Annual Sports day celebrated in your university.